U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
1325 East-West Highway
Silver Spring, Maryland 20910-3283

MAR 0 5 1999

Mr. Carl F. Enson, P.E.
Chief, Engineering and
Construction Division
U.S. Army Corps of Engineers
20 Massachusetts Avenue, N.W.
ATTN: CECW-EC
Washington, D.C. 20314-1000

Dear Mr. Enson:

Your letter of February 18, 1999, and its numerous enclosures raises both technical and procedural issues regarding the National Weather Service (NWS) estimate of Probable Maximum Precipitation (PMP) for the Cherry Creek Dam drainage provided by my office in July 1995. The technical issues are addressed in Enclosure 1, responding to Dr. Tomlinson's transmittal of August 19, 1997, which you included in your letter.

The procedural issues raised in your letter and its enclosures are concerned with the process followed by the NWS to review the Cherry Creek Dam study. Site-specific PMP studies produced by the NWS are assigned to a qualified PMP analyst and the completed study is reviewed by the technical manager who oversees the analyst. Once this review is completed, the NWS transmits the final study to the agency requesting the study. For this particular study, the PMP analyst was Douglas D. Fenn (assisted by Douglas R. Kluck). Louis C. Schreiner, author of Hydrometeorological Reports #51, #52, and #55A, was also consulted about the appropriateness of the procedures and he agreed. John L. Vogel was the technical manager; he completed his review on July 12, 1995, and the report was transmitted to the Corps of Engineers (COE) on July 13, 1995. Curriculum vitae of Messrs. Fenn, Kluck and, Vogel are provided as Enclosures 2, 3, and 4.

In consideration of the concerns expressed in your letter, I have asked for a further review of this study. John T. Riedel completed this review on February 25, 1999. Mr. Riedel's report and curriculum vitae are provided as Enclosures 5 and 6; he concluded (in part):

> "Following a thorough review of the methodology applied in the site-specific study, I conclude that the approach is sound and within the current state of the practices of PMP analyses. Furthermore, a brief comparison of the results of the study with referenced studies and storms in the area gives no evidence to believe there are significant errors that would substantially change the results."

In addition to the reviews of the site-specific PMP study for Cherry Creek Dam, the NWS PMP methodology has been the subject of a thorough scientific peer review by the National Research Council (Estimating Bounds on Extreme Precipitation Events--A Brief Assessment, National Academy Press, 1994, (Enclosure 7)) which concluded (in part):

> ". . . there is no compelling argument for making immediate widespread changes in either PMP methodology or the NWS assessments of PMP, and the Committee recommends its continued use."

The NWS regional reports which form the basis for site-specific studies and estimates of PMP are also subject to a review process. The particular report of greatest interest to the Cherry Creek Dam is *Probable Maximum Precipitation Estimates, United States Between Continental Divide and the 103rd Meridian*, 1988, Hydrometeorological Report No. 55A. This report was reviewed in detail during 1986-88 by the "Interagency Hydrometeorological Study Team" including representatives of the NWS, COE, Bureau of Reclamation, Soil Conservation Service (now renamed Natural Resources Conservation Service), and consultants.

In summary, both the methodology used by NWS to assess PMP and the NWS assessments have been subject to thorough reviews.

Sincerely,

Danny L. Fread
Director
Office of Hydrology

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